**DO NOT LOSE THIS PACKET**

**Algebra 1B – Final Exam Study Guide Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Part 1: Vocabulary and Written Response**

* 1. What is a *function*?

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* 1. Describe a real-world situation that can be modeled by a function.

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* 1. What is a *solution* to a single variable equation?

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* 1. What is a *solution* to a *linear* equation?

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* 1. What is a *solution* to a *system of linear equations*?

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* 1. What is a *solution* to a *system of linear* ***inequalities****?*

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* 1. What are the other names for a “solution” to a *quadratic* equation?

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* 1. Fill in the table below.

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|  | **Defining Features** | **Equation** | **Graph** |
| **Linear Functions** |  |  |  |
| **Exponential Functions** |  |  |  |
| **Quadratic Functions** |  |  |  |

**Part 2: Writing Equations**

**Linear Equations:**

* + 1. What is the basic form of a linear equation? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    2. What makes two lines parallel to each other? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    3. What makes two lines perpendicular to each other? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    4. How do you calculate the slope/rate of change of a line when all you have is two points?

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* + 1. Write a slope-intercept form equation for a line that has a y-intercept of two and a slope of negative five.
    2. Write a slope-intercept form equation for the line that passes through (2, -3) and (5, 6).
    3. Write a slope-intercept form equation for the line that passes through (3, -2) and is parallel to the line:
    4. Write a slope-intercept form equation for the line that passes through (1, 8) and is perpendicular to the line:

**Exponential Equations:**

* + 1. What is the basic form of an exponential equation, and what do each of the variables represent?
    2. What makes an exponential equation one of exponential *growth* and what makes it an equation of exponential *decay*?
    3. Write an exponential equation in which the initial value is eight and the growth factor is three.
    4. Write an exponential equation for the following scenario:

*A population of rabbits has 1,250 male rabbits. The male rabbit population is doubling every month.*

*You have $10 in your bank account and it’s tripling every month.*

*The value of your music collection is $100 now but its value is being cut in half every year.*

**Quadratic Equations:**

* 1. What is the standard form of a quadratic equation, and how does each variable affect the graph of the quadratic equation?
  2. Write the “parent” quadratic equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. Write the equation for a parabola that is narrower than the parent function: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  4. Write the equation for a parabola that is wider that the parent function: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  5. Write the equation for a parabola that has no real solutions: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  6. Write the equation for a parabola that has one real solution: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  7. Write the equation for a parabola that has two real solutions: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  8. Write the equation for a parabola that opens up: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  9. Write the equation for a parabola that opens down: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  10. Write the equation for a parabola that has x-intercepts of 5 and -2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  11. Write the equation for a parabola that has a y-intercept of -17: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  12. Write the equation for a parabola that is narrower than the parent function, opens down, and has one solution:

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* 1. Write the equation for a parabola that is wider than the parent function, opens up and has no solutions:

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**Part 3: Function Notation**

Use the graph of f(x) and the equation g(x) to find the following values.

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**Part 4: Graphing**

* + 1. How do you graph a linear equation when it is in slope-intercept form?

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* + 1. How do you graph a linear equation when it is in standard form?

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| * 1. Graph the following linear equations. You must NAME and EXTEND your lines.  1. B) C) D) 2. E) F)   C:\Users\John\Downloads\graph_20150516_220240.png |

1. How do you graph a *linear inequality*?

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1. How is the solution set to a linear inequality with a < sign different from the solution set to the same inequality with a ≤ ?

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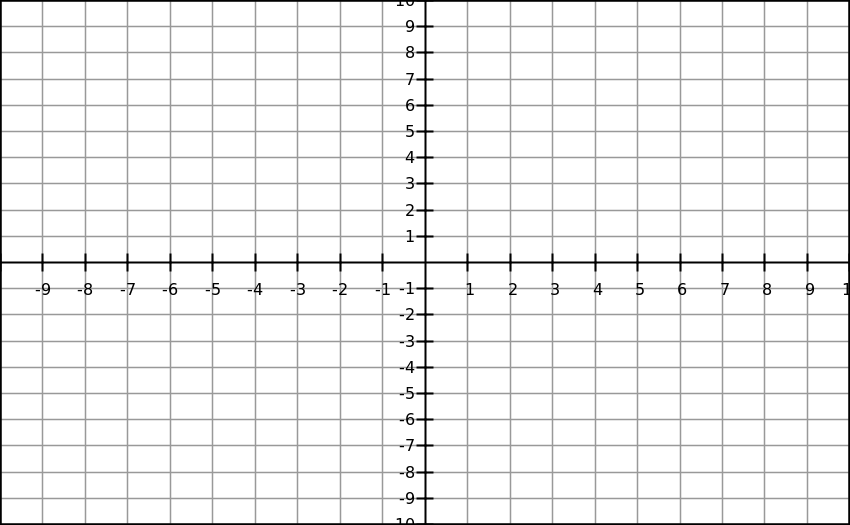
1. Can a system of linear inequalities have *no solution*? Explain.

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1. Graph the inequality. Clearly show the solution zone and whether you are using a solid line or a dashed line.



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| --- |
| Graph the system of inequalities to show the solution to the system. Be sure to clearly show dashed/solid lines, and clearly mark the solution zone.  C:\Users\John\Downloads\graph_20150517_053126.png |

1. What are the two things you need to know about a parabola to be able to graph it?

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1. How do you graph a quadratic function in standard form?

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1. How do you graph a quadratic function in factored form?

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| --- |
| Graph the function Show all calculations in the space provided.  C:\Users\John\Downloads\graph_20150516_221041.png |
| Graph the function Show all calculations in the space provided.  C:\Users\John\Downloads\graph_20150516_221041.png |

**Part 5: Systems of Linear Equations**

* + 1. What are the three main ways to solve a system of linear equations?

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
3. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
   * 1. How can a system of linear equations have *no solution?*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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* + 1. How can a system of linear equations have *one solution*?

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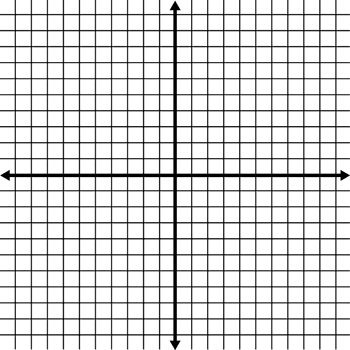
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. How can a system of linear equations have *infinite solutions*?

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* + 1. Solve the system by graphing.

* + 1. Solve the system using substitution.
    2. Solve the system using elimination.
    3. Solve the system using the method of your choice.

**Part 6: Exponential Simplification**

* + - 1. If an exponential expression is in its *simplest* form, what two things will it *NOT* have?

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
   * + 1. Simplify the following exponential expressions so that they are in their simplest form.

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**Part 7: Writing and Naming Polynomials**

Complete the following chart with the correct polynomial names based on degree and on number of terms.

**Classifying Polynomials**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Degree | Name by Degree |  | Number of Terms | Name by Term |
| **0** |  |  | **0** |  |
| **1** |  |  | **1** |  |
| **2** |  |  | **2** |  |
| **3** |  |  | **3** |  |
| **4** |  |  | **4** |  |
| **5** |  |  | **5** |  |
| **6** |  |  | **6** |  |
| **7** |  |  | **7** |  |

Simplify each polynomial expression, then write it in standard form. Last, name each polynomial by term and by degree.

|  |
| --- |
| 4x2 - 3x3 standard form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| -10y + 1 standard form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 7x2 - 9x4 + 1 standard form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 9 + 2y2 - 10 standard form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Part 8: Polynomial Operations**

Complete each operation. Write your answers in simplified, standard form.

|  |
| --- |
| (w3 - 2 + w) + (-w - 2 - w3) |
| (-x4 + 5x3 + 6x - 1) + (2x3 - 6x2 - 9x + 1) |
| (-10y3 + 4y2 - 7y - 4) - (5y3 - 5y - 4y2 + 1) |
| 3g3(-5g2 - 1 + g) |
| (y + 3)(y - 6) |
| (6h2 + 4)(-h2 + 9) |

**Part 9: Factoring Polynomials**

What is the difference between *factoring* and distributing?

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How can you tell when you have factored a polynomial *completely*?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Factor the following polynomials **completely.**

|  |
| --- |
| a2 + 9a + 20 |
| 3b2 - 10b + 8 |
| 36n2 - 25 |
|  |
| 7h3 - 21h |
| 8x3 - 28x2 + 4x - 14 |

**Part 11: Quadratics**

Complete the table with the correct information about the given quadratic equation.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Equation | Does the parabola open  **upward** or **downward**? | N**arrower,** **wider**, or the **same width** as parent QF? | y-intercept? | Axis of symmetry? | Vertex? |
|  |  |  |  |  | (\_\_\_\_, \_\_\_\_) |

List all the different ways you know to *solve* a quadratic equation.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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What form does a quadratic equation have to be in before you can solve the equation by factoring or by using the quadratic formula?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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What form should a quadratic equation be in before you can solve the equation by taking the square root of both sides of the equation?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Solve the following equation two different ways. Show ALL work.

**x2 - 3x – 12 = -2**

|  |  |
| --- | --- |
| **Factoring** | **Quadratic Formula** |

Solve the following equations using the method of your choosing. BOX your answer and show ALL work.

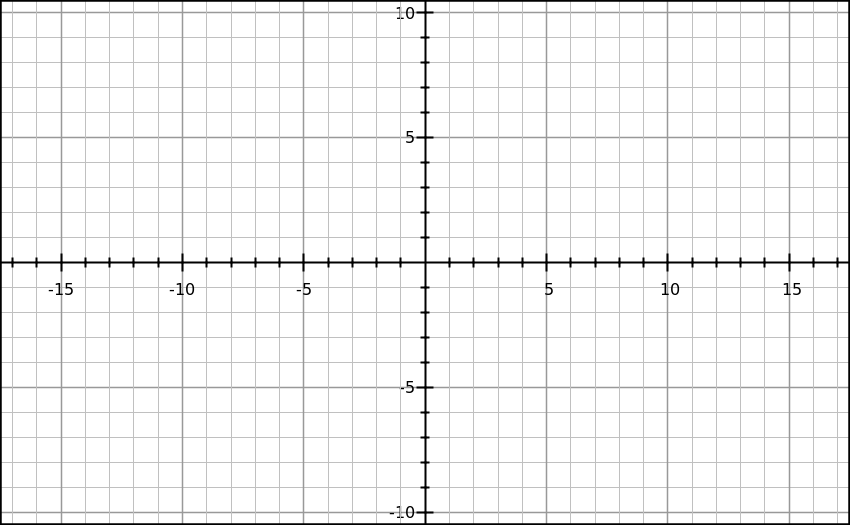
|  |  |
| --- | --- |
|  |  |

|  |  |
| --- | --- |
|  |  |

**Part 12: Transformations**

* 1. a) Graph the triangle with the given vertices. LABEL and CONNECT the vertices.

A (4, 5) B (4, 1) C (1, 2)



b) Reflect the trianlge over the y-axis. LABEL and CONNECT the vertices and write the new vertices below.

A’(\_\_\_\_\_\_, \_\_\_\_\_\_\_) B’(\_\_\_\_\_\_, \_\_\_\_\_\_\_) C’(\_\_\_\_\_\_, \_\_\_\_\_\_\_)

c) Translate your triangle from part b four units down and one unit to the left. LABEL and CONNECT the vertices and write the new vertices below.

A”(\_\_\_\_\_\_, \_\_\_\_\_\_\_) B”(\_\_\_\_\_\_, \_\_\_\_\_\_\_) C”(\_\_\_\_\_\_, \_\_\_\_\_\_\_)

d) Dilate your triangle from part c by a factor of two. LABEL and CONNECT the vertices and write the new vertices below.

A”’(\_\_\_\_\_\_, \_\_\_\_\_\_\_) B’”(\_\_\_\_\_\_, \_\_\_\_\_\_\_) C’”(\_\_\_\_\_\_, \_\_\_\_\_\_\_)

e) Rotate your triangle from part *d* 90 degrees clockwise.

LABEL and CONNECT the vertices and write the new vertices below.

A””(\_\_\_\_\_\_, \_\_\_\_\_\_\_) B””(\_\_\_\_\_\_, \_\_\_\_\_\_\_) C””(\_\_\_\_\_\_, \_\_\_\_\_\_\_)